IN THE CLAIMS

1. (Original) A flow diagnostic system adapted to couple to a primary flow sensing element via impulse lines, the flow diagnostic system comprising:

a pressure transmitter coupled to the impulse lines and generating digital pressure data representing pressure;

a control system receiving the pressure data and providing the pressure data and real time clock readings associated with pressure data to a diagnostic application stored in the flow diagnostic system, the diagnostic application including:

a first algorithm calculating a difference between the pressure data and a moving average of the pressure data, and

a second algorithm receiving the difference and calculating a trained data set of historical pressure data during a training mode and calculating a current pressure data set during a monitoring mode and generating diagnostic data as a function of the current pressure data set relative to the historical pressure data indicating changes in the condition of flow sensing, and

a third algorithm generating a report indicating the diagnostic data.

2. (Original) The flow diagnostic system of Claim 1 wherein the diagnostic application is stored in the control system.

3. (Original) The flow diagnostic system of Claim 2 further

comprising a network coupled to the control system, and the network provides the diagnostic application to the control system.

4. (Original) The flow diagnostic system of Claim 3 wherein the network includes an application service provider (ASP), and the ASP provides the diagnostic application to the control system via the network.

5. (Original) The flow diagnostic system of Claim 3 wherein the pressure data and associated real time clock reading are temporarily stored in the control system and later coupled via the network to the diagnostic application.

6. (Original) The flow diagnostic system of Claim 1 further comprising an application service provider (ASP) wherein the control system provides the pressure data and the associated real time clock readings to the ASP, and the diagnostic application is stored in the ASP.

7. (Original) The flow diagnostic system of Claim 1 wherein the pressure transmitter provides the real time clock readings to the control system.

8. (Original) The flow diagnostic system of Claim 1 wherein the control system generates the real time clock readings.

9. (Original) The flow diagnostic system of Claim 1 further comprising a remote computer wherein the control system provides the pressure data and the associated real time clock readings to the remote computer, and the diagnostic application is stored in the remote computer.

10. (Original) The flow diagnostic system of Claim 1 wherein the

moving average is calculated according to the series

$$A_j = \sum_{k=0}^{m} (P_{j+k}) \ (W_k)$$

where A is the moving average, P is a series of sensed pressure values, and W is a weight for a sensed pressure value, m is a number of previous sensed pressure values in the series.

11. (Original) The flow diagnostic system of Claim 1 wherein the trained data set comprises statistical data.

12. (Original) The flow diagnostic system of Claim 1 wherein the diagnostic data indicates a real time condition of a pressure generator including a primary element and impulse lines.

13. (Original) The flow diagnostic system of Claim 1 wherein the diagnostic data indicates a condition of the primary flow element.

14. (Original) The flow diagnostic system of Claim 1 wherein the diagnostic data indicates a condition of the impulse lines.

15. (Original) The flow diagnostic system of Claim 1 wherein the pressure data comprises a calibrated output, and the diagnostic data indicates if a pressure generator including a primary element and impulse lines is out of calibration.

16. (Original) The flow diagnostic system of Claim 1 wherein the trained data set of historical data comprises power spectral density of the difference.

17. (Original) The flow diagnostic system of claim 16 wherein the power spectral density data is in the range of 0 to 100 Hertz.

18. (Original) The flow diagnostic system of claim 1 wherein the pressure transmitter is adapted to couple to a pitot tube primary flow element.

19. (Original) The flow diagnostic system of claim 18 wherein the pitot tube is an averaging pitot tube.

20. (Original) The flow diagnostic system of claim 18 further comprising an instrument manifold coupled between the pressure transmitter and a pressure generator comprising a primary element and impulse lines.

21. (Original) The flow diagnostic system of claim 1 wherein the primary flow element and impulse lines are combined in an integral orifice.

22. (Original) The flow diagnostic system of claim 1 wherein the pressure transmitter is adapted to couple to a venturi primary flow element.

23. (Original) The flow diagnostic system of claim 1 wherein the pressure transmitter is adapted to couple to a nozzle primary flow element.

24. (Original) The flow diagnostic system of claim 1 wherein the pressure transmitter is adapted to couple to an orifice primary flow element adapted for clamping between pipe flanges.

25. (Original) The flow diagnostic system of Claim 1 further comprising a signal preprocessor algorithm that provides an output to a signal evaluator in the first difference algorithm.

26. (Original) The flow diagnostic system of Claim 25 wherein the

signal preprocessing algorithm utilizes a processing algorithm selected from the group of wavelet transformation, Fourier transformation, neural networks, statistical analysis.

27. (Original) The flow diagnostic system of Claim 25 wherein the signal preprocessing algorithm is implemented in the first differencing algorithm.

28. (Original) A computer-readable medium having stored thereon instructions executable by a flow diagnostic system to cause the flow diagnostic system to perform a diagnostic operation relative to a primary element and impulse lines couplable to a pressure transmitter, the instructions comprising:

calculating a difference between a pressure sensed by the pressure transmitter and a moving average of the sensed pressure;

acquiring and storing an historical data set of the calculated difference during a training mode of the flow diagnostic system;

acquiring and storing a current data set of the calculated difference during a monitoring mode of the flow diagnostic system;

comparing the current data set to the historical data set to diagnose the condition of one of the group consisting of the primary element and impulse lines;

generating a diagnostic report indicating the condition of one of the group consisting of the primary element and impulse lines.

29.(Currently Amended) A method performed in a flow diagnostic system for detecting a degrading primary element or degrading impulse piping in a process control system, comprising:

obtaining a measurement signal related to flow of a process fluid;

retrieving a baseline statistical parameter for a baseline primary element or impulse piping from a memory;

calculating a ~~current statistical parameter~~ moving average of the measurement signal;

comparing the baseline statistical parameter to the ~~current statistical parameter~~ moving average; and

providing a diagnostic output based upon the step of comparing, the diagnostic output indicative of a degrading primary element or impulse piping.

30. (Original) The method of claim 29 wherein the step of comparing includes performing a fuzzy logic operation.

31. (Original) The method of claim 29 wherein the step of calculating comprises calculating standard deviation.

32. (Original) The method of claim 29 wherein the flow diagnostic system comprises a differential pressure transmitter.

33. (Original) The method of claim 29 wherein the primary element is selected from the group of primary elements consisting of a venturi tube, flow nozzle and averaging pitot tube.

34. (Original) The method of claim 29 wherein the baseline primary element comprises a substantially new primary element.

35. (Original) The method of claim 29 wherein the baseline impulse piping comprises new impulse piping.

36. (Original) The method of claim 29 wherein the step of comparing parameters implements an algorithm selected from the group of algorithms consisting of neural networks, fuzzy logic, wavelets and Fourier transforms.

37. (Previously Added) The flow diagnostic system of claim 1 wherein the diagnostic data is indicative of an estimate of a residual lifetime.

38. (Previously Added) The flow diagnostic system of claim 1 wherein the diagnostic data is indicative of a failure of a residual lifetime.

39. (Previously Added) The flow diagnostic system of claim 1 wherein the diagnostic data is indicative of an impending failure of a residual lifetime.

40. (Previously Added) The method of claim 29 wherein the diagnostic output provides a residual lifetime estimate.

41. (Previously Added) The method of claim 29 wherein the diagnostic output is indicative of a failure.

42. (Previously Added) The method of claim 29 wherein the diagnostic output is indicative of an impending failure.